

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

IN RE THE

APPLICATION OF: William Salkewicz

APPLICATION NO.: Not yet assigned

FILED: Herewith

TITLE: DYNAMIC BINDING OF  
NETWORK SERVICES

ART UNIT: Not yet assigned

EXAMINER: Not yet assigned

**PRELIMINARY AMENDMENT**

The Commissioner for Patents  
**BOX PATENT APPLICATION**  
Washington, D.C. 20231

Applicant respectfully requests entry of this preliminary amendment prior to calculation of the filing fee and examination of this divisional application.

**IN THE SPECIFICATION**

On page 1, please correct the title to read -- DYNAMIC BINDING OF NETWORK SERVICES--

On page 1, please insert the following sentence as the first sentence of this application.

This patent application is a divisional patent application of U.S. Patent Application Serial No. 09/220,413, filed December 24, 1998, now pending.

## IN THE CLAIMS

Please cancel claims 1-5 and add claims 6-30.

## PENDING CLAIMS

6. A network device comprising:
- at least one processor;
  - memory;
  - I/O; and
  - at least one virtual network machine in the memory, said at least one first virtual network machine including a first network interface;
  - a first sub-interface data structure in the memory; and
  - a first binding data structure in the memory which binds the first network interface to the first sub-interface data structure.
7. The network device of claim 6 wherein,
- the first network interface is a layer 3 network interface;
  - the first sub-interface data structure is a layer 2 interface data structure; and
  - the first binding data structure is layer 2/3 binding structure which binds the first layer 3 network interface to the layer 2 interface data structure.

8. An electronic memory encoded with:  
at least one virtual network machine, said at least one first virtual network machine including  
a first network interface;  
a first sub-interface data structure; and  
a first binding data structure which binds the first network interface to the first sub-interface data structure.
9. The electronic memory of claim 8 wherein:  
the first network interface is a layer 3 network interface;  
the first sub-interface data structure is a layer 2 interface data structure; and  
the first binding data structure is a layer 2/3 binding data structure which binds the first layer 3 interface to the first layer 2 interface data structure.
10. A method of creating a link in at least one network domain comprising:  
providing a network device including an electronic memory encoded with at least one virtual network machine which includes at least one network interface;  
providing at least one sub-interface data structure encoded in the electronic memory; and  
binding the at least one network interface to the at least one sub-interface data structure.
11. The method of claim 10 wherein binding includes creating a binding data structure that binds the at least one network interface to the at least one sub-interface data structure.

12. The method of claim 10 further comprising:  
providing at least one other network interface encoded in the electronic memory; and  
binding the at least one other network interface to the at least one sub-interface data structure.
13. The method of claim 12 further including:  
eliminating the binding of the at least one network interface to the at least one sub-interface data structure.
14. The method of claim 10 further comprising:  
providing at least one other sub-interface data structure encoded in the electronic memory;  
and  
binding the at least one network interface to the at least one other sub-interface data structure.
15. The method of claim 14 further including:  
eliminating the binding of the at least one network interface to the at least one sub-interface data structure.
16. The method of claim 10,  
wherein binding the at least one network interface to the at least one sub-interface data structure includes creating a binding data structure that binds the at least one network interface to the at least one sub-interface data structure; and further including:  
providing at least one other network interface encoded in the electronic memory;

binding the at least one other network interface to the at least one sub-interface data structure;

wherein binding the at least one other network interface to the at least one sub-interface data structure includes creating a binding data structure that binds the at least one other network interface to the at least one sub-interface data structure; and

eliminating the binding of the at least one network interface to the at least one sub-interface data structure while leaving the at least one network interface intact.

17. The method of claim 10,

wherein binding the at least one network interface to the at least one sub-interface data structure includes creating a binding data structure that binds the at least one network interface to the at least one sub-interface data structure; and further including:

providing at least one other network interface encoded in the electronic memory;

providing the at least one other sub-interface data structure encoded in electronic memory;

binding the at least one other network interface to the at least one other sub-interface data structure;

wherein binding the at least one network interface to the at least one other sub-interface data structure includes creating a binding data structure that binds the at least one network interface to the at least one other sub-interface data structure;

binding the at least one other network interface to the at least one other sub-interface data structure;

wherein binding the at least one other network interface to the at least one other sub-interface data structure includes creating a binding data structure that binds the at least one other network interface to the at least one other sub-interface data structure;

eliminating the binding of the at least one network interface to the at least one sub-interface data structure while leaving the at least one network interface intact.

18. A method of creating a link in a network domain comprising:

providing a network device including an electronic memory encoded with a first virtual network machine which includes at least one first network interface and with a second virtual network machine which includes at least one second network interface;

providing at least one first sub-interface data structure encoded in the electronic memory;

providing at least one second sub-interface data structure encoded in the electronic memory;

binding the at least one first network interface to the at least one first sub-interface data structure; and

binding the at least one second network interface to the at least one second sub-interface data structure.

19. The method of claim 18 wherein,

binding the at least one first network interface to the at least one first sub-interface data structure includes creating a first binding data structure; and

binding the at least one second network interface to the at least one second sub-interface data structure includes creating a second binding data structure.

20. The method of claim 18 further including:

binding the at least one second network interface to the at least one first sub-interface data structure; and

eliminating the binding of the at least one second network interface to the at least one second sub-interface data structure.

21. The method of claim 18 further including:

providing respective first and second network databases associated with the respective first and second virtual network machines wherein such respective first and second databases include one or more types of control information used to manage or monitor operations, selected from the group consisting of: network (layer 3) addressing, layer 3 connections, routing, routing protocols, route filters and policies, tunneling, tunneling protocols.

22. The method of claim 18 further including:

providing respective first and second network databases associated with the respective first and second virtual network machines wherein such respective first and second databases include control information used to manage or monitor operations, selected from the group consisting of: network (layer 3) addressing, layer 3 connections, routing, routing protocols, route filters and policies, tunneling, tunneling protocols;

binding the at least one first network interface to the at least one first sub-interface data structure includes creating a first binding data structure; and

binding the at least one second network interface to the at least one second sub-interface data structure includes creating a second binding data structure.

23. The method of claim 18 further including:

providing respective first and second network databases associated with the respective first and second virtual network machines wherein such respective first and second databases include one or more types of control information used to manage or monitor operations, selected from the group consisting of: network (layer 3) addressing, layer 3 connections, routing, routing protocols, route filters and policies, tunneling, tunneling protocols;

binding the at least one first network interface to the at least one first sub-interface data structure includes creating a first binding data structure;

binding the at least one second network interface to the at least one second sub-interface data structure includes creating a second binding data structure;

binding the at least one second network interface to at least one first sub-interface data structure; and

eliminating the binding of the at least one second network interface to the at least one second sub-interface data structure.

24. A method of creating links between multiple subscriber end stations and multiple network domains comprising:

providing a network device including an electronic memory encoded with multiple respective virtual network machines, said respective virtual network machines including respective



corresponding network databases which include respective control information that respectively imparts router functionality to corresponding respective virtual network machines; said respective virtual network machines respectively each including at least one respective network interface for a respective network domain;

providing respective subscriber records in an electronic memory that include respective information as to network domains to which respective subscriber end stations of respective subscribers may access;

providing multiple respective sub-interface data structures in the electronic memory respectively associated with respective subscribers;

searching respective subscriber records to identify respective network domains that may be accessed by a respective subscriber end station of a respective subscriber; and

creating respective binding data structures that respectively bind respective sub-interface data structures respectively associated with respective subscribers to respective network interfaces for respective network domains identified from searching respective subscriber records.

25. The method of claim 24 further including:

providing respective subscriber authentication information and respective subscriber authorization information in respective subscriber records;

providing subscriber authentication and authorization services; and

authenticating and authorizing subscriber access to respective network domains using respective subscriber records and the subscriber authentication and authorization services.

26. The method of claim 24 wherein,  
the multiple respective sub-interface data structures include multiple respective virtual circuits.

27. The method of claim 24 further including:  
providing in respective subscriber records multiple possible network domain binding options for a respective subscriber.

28. The method of claim 24 wherein,  
information in respective subscriber records identify multiple respective possible network domains to which respective subscriber end stations of respective subscribers may be bound; and  
information in respective subscriber records provide respective criteria for selecting between multiple respective network domains for a respective subscriber.

29. A subscriber management system comprising:  
a network device including an electronic memory encoded with multiple respective virtual network machines in the memory, said respective virtual network machines including corresponding respective network databases which include respective control information that respectively imparts router functionality to corresponding respective virtual network machines, said respective virtual network machines respectively including at least one respective network interface to a respective network domain;

respective subscriber records in an electronic memory that include respective information as to network domains to which respective subscriber end stations of respective subscribers may be bound;

multiple respective sub-interface data structures in the electronic memory respectively associated with respective subscribers;

a computer program in electronic memory that searches respective subscriber records to identify respective network domains that may be accessed by respective subscriber ends stations of respective subscribers; and

respective binding data structures that respectively bind respective sub-interface data structures associated with respective subscribers to respective network interfaces to respective network domains identified from searching respective subscriber records.

30. The system of claim 29 wherein,

information in respective subscriber records identify multiple respective possible network domains to which respective subscriber end stations of respective subscribers may be bound; and

information in respective subscriber records provide respective criteria for selecting between multiple respective network domains for respective subscribers.

Table 1. *Continued*

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**MARKED-UP VERSION OF AMENDMENTS**

On page 1, the following sentence has been inserted as the first sentence of this application.

--This patent application is a divisional patent application of U.S. Patent Application Serial No. 09/343,293, filed June 30, 1999, now pending.--

Claims 1-5 have been canceled and claims 6-30 have been added.